

AA Sub B1
31. (Amended) A method of detecting a face in a color digital image formed of a plurality of pixels, said method comprising the steps of:

testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing at least one image capture condition provided with the color digital image; and

subjecting only those pixels determined in said testing step as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

32. (Amended) A method according to claim 31, wherein the at least one image capture condition is acquired at a time the color digital image is captured.

33. (Amended) A method according to claim 32, wherein the color digital image is encoded according to a predetermined format and the at least one image capture condition is represented as meta-data associated with the predetermined format.

34. (Amended) A method according to claim 31 wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured.

35. (Amended) A method according to claim 31, wherein said testing step comprises the sub-step, preceding the testing, of dividing the color digital image into a plurality of regions, each region comprising a plurality of pixels,

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wherein the testing is performed on pixels within each region to determine those ones of the plurality of regions that are predominantly skin color, and said subjecting step comprises performing the further facial feature analysis on only those regions determined to be predominantly of skin color.

36. (Amended) A method according to claim 31, wherein said testing step utilizes at least one predetermined color distribution model, the color distribution model having been generated using previously sampled facial image data.

37. (Amended) A method according to claim 36, wherein the color distribution model is generated for a particular image capture device.

38. (Amended) A method according to claim 36, wherein separate color distribution models are generated for different image capture conditions.

39. (Amended) A method according to claim 38, wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured and separate color models are generated for different lighting conditions at a time the previously sampled facial image data was captured.

40. (Amended) A method according to claim 39, wherein separate color distribution models are generated for groups of images taken with a flash and images taken without a flash.

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41. (Amended) A method according to claim 39, wherein separate color distribution models are generated for groups of images taken indoors and images taken outdoors.

42. (Amended) A method according to claim 36, wherein each color distribution model is represented as a frequency histogram of color representation vectors.

43. (Amended) A method according to claim 36, wherein each color distribution model is represented as a probability distribution of color representation vectors.

44. (Amended) A method according to claim 36, wherein each color distribution model is represented as a binary map of color representation vectors.

45. (Amended) A method according to claim 42, 43 or 44, wherein the color representation vectors are derived from perceptual color space values of predetermined skin-color pixels in the previously sampled facial image data.

46. (Amended) A method according to claim 42, 43 or 44, wherein color representation vectors contain chromatic color values derived from those RGB values of predetermined skin-color pixels in the previously sampled facial image data.

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47. (Amended) A method according to claim 44, wherein the binary map comprises a percentage of the skin color pixels that were identified in the previously sampled facial image data.

48. (Amended) A method according to claim 47, wherein one of the plurality of pixels is classified as being skin color if the color representation vector corresponding thereto occurs within the binary map.

49. (Amended) A method according to claim 42, wherein each of the plurality of pixels is classified as being skin color if the frequency of the color representation vector corresponding thereto exceeds a predetermined threshold frequency.

50. (Amended) A method according to claim 43, wherein each of the plurality of pixels is classified as being skin color if the probability of the color representation vector corresponding thereto exceeds a predetermined probability threshold.

51. (Amended) A method according to claim 35, wherein one of the plurality of regions is determined to be predominantly skin color if more than a predetermined percentage of the total number of pixels in the one region are classified as being skin color.

52. (Amended) A method according to claim 35, wherein the plurality of regions are geometrically divided from the color digital image.

53. (Amended) A method according to claim 35, wherein the plurality of regions are formed of pixels having substantially homogenous color.

54. (Amended) A method according to claim 53, wherein the plurality of regions are formed using a region growing method based upon color differences.

55. (Amended) A method according to claim 35, wherein said subjecting step is independent of face color.

56. (Amended) An apparatus for detecting a face in a color digital image formed of a plurality of pixels, said apparatus comprising:

means for testing the color of the plurality of pixels to determine those pixels having predominantly skin color, said testing means utilizing at least one image capture condition provided with the color digital image; and

means for subjecting only those pixels so determined as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

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57. (Amended) An apparatus according to claim 56, wherein the at least one image capture condition is acquired at a time the color digital image is captured.

58. (Amended) An apparatus according to claim 57, wherein the color digital image is encoded according to a predetermined format and the at least one image capture condition is represented as meta-data associated with the predetermined format.

59. (Amended) An apparatus according to claim 56, wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured.

60. (Amended) An apparatus according to claim 56, wherein said means for testing comprises means for dividing the color digital image into a plurality of regions, each region comprising a plurality of pixels,

wherein said means for testing operates on pixels within each region to determine those ones of the plurality of regions that are predominantly skin color and said means for subjecting causes the further facial feature analysis to be performed on only those regions determined to be predominantly of skin color.

61. (Amended) A computer readable medium incorporating a computer program product for detecting a face in a color digital image formed of a plurality of pixels, said computer program product comprising code for:

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testing the color of the plurality of pixels to determine those pixels having predominantly skin color, the testing utilizing at least one image capture condition provided with the color digital image; and

subjecting only those pixels so determined as having predominantly skin color to further facial feature analysis whereby those pixels not having a predominantly skin color are not subjected to the further facial feature analysis.

62. (Amended) A computer readable medium according to claim 61, wherein the at least one image capture condition is acquired at a time the color digital image is captured.

63. (Amended) A computer readable medium according to claim 62, wherein the color digital image is encoded according to a predetermined format and the at least one image capture condition is represented as meta-data associated with the predetermined format.

64. (Amended) A computer readable medium according to claim 61, wherein the at least one image capture condition comprises lighting conditions at a time the color digital image was captured.

65. (Amended) A computer readable medium according to claim 61, wherein said code for testing comprises code for dividing the color digital image into a plurality of regions, each region comprising a plurality of pixels,